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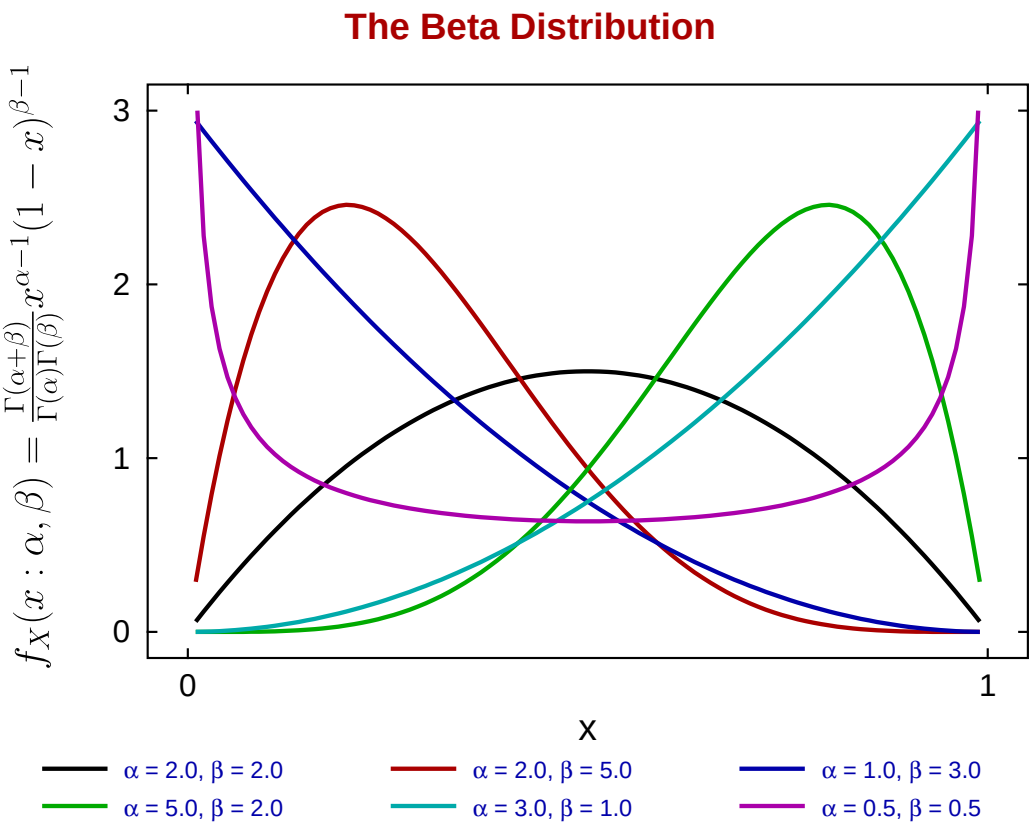
https://simfit.org.uk

Sometimes it is required to use LaTeX to display a mathematical equation but with the formula rotated so it can be used as the y axis label inside a scientific SVG plot, and this document describes how to do this using the beta probability distribution as an example.

Note that all the files mentioned in this document are distributed as SimFIT test files so that users simply wishing to create the final composed document can proceed directly to the last section describing how to use **EditSVG**.

The beta probability density function

Consider, for example, the wide variety of shapes possible for the beta probability distribution as the two positive parameters α and β are varied as shown next.



This distribution is widely used in data analysis where a unimodal distribution is required as an empirical equation to model data as positive frequencies for a variable x that can be scaled into the range $0 \le x \le 1$.

The great advantage of this distribution is that for positive parameters α and β a great variety of shapes can be generated to illustrate and quantify skew and kurtosis with frequency histograms.

The LaTeX source

This is the LaTeX code contained in the file `latex_beta_pdf.tex` to generate the rotated formula.

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\usepackage{graphicx}
\pagestyle{empty}
\begin{document}
\Large
\rotatebox{90}{$ f_X(x:\alpha,\beta) = \frac{\Gamma(\alpha +
\beta)}{\Gamma(\alpha)\Gamma(\beta)}x^{\alpha - 1}(1 - x)^{\beta - 1}$}
\end{document}
```

which displays the mathematical definition of the beta function (shown before rotation) as follows.

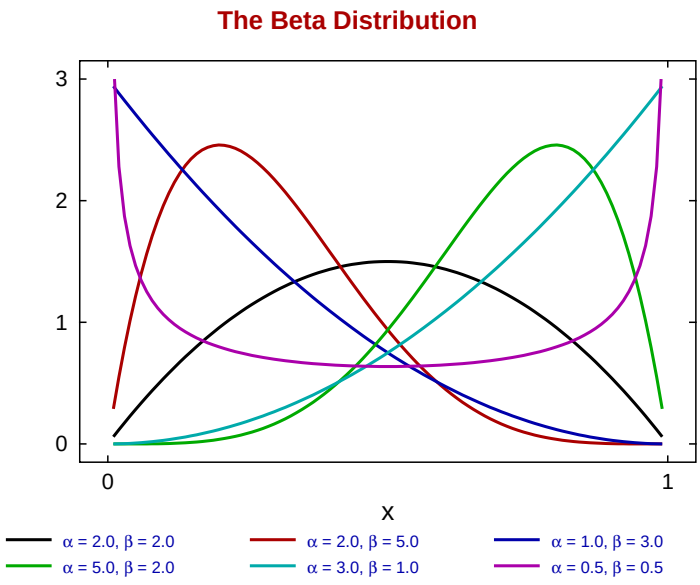
$$f_X(x:\alpha,\beta) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}x^{\alpha-1}(1-x)^{\beta-1}$$

In order to import this formula into a graph using **EditSVG** the code must be used to create the corresponding SVG file `latex_beta_pdf.svg`, the overall process being the following sequence of commands.

- **latex** `latex_beta_pdf.tex`
- **dvips** `latex_beta_pdf.dvi`
- **dvisvgm** `-E latex_beta_pdf.ps`

The file `latex_beta_pdf.svg` created is then ready to be imported into **EditSVG** but, alternatively, the source file `latex_beta_pdf.tex` can be opened in or dragged and dropped directly onto **EditSVG** if there is a local installation of LaTeX. When using LaTeX in this way to create a SVG file, the command line must be used from a folder containing the *.TEX file required as a local file and not as a fully qualified path–filename to a remote source file. The program **EditSVG** circumvents this issue when importing LaTeX source by creating local copies of all files.

Creating the plot file



The file `beta_pdf_plot.svg` with the $f_X(x : \alpha, \beta)$ to be used looks like the previous figure before the equation is added.

This figure was created using the SimFIT program **makmat** by selecting to display the beta distribution $f_X(x : \alpha, \beta)$) with various values for the positive parameters α and β over the range $0.01 \leq x \leq 0.99$ so as to avoid the poles at either extreme. Users wishing to avoid this process can simply read the SimFIT metafile `beta_pdf_plot.metafile` directly into the SimFIT program **simplot**, or the SimDEM program **simdem70**. In either case the file is then saved as `beta_pdf_plot.svg` using the [Win] or [SVG] option.

Joining the SVG files using EditSVG

First open program **EditSVG** then input the test file `beta_pdf_plot.svg` to act as a main plot, then there two possible options.

1. Input the test file `latex_beta_pdf.svg` directly; or
2. read in the test file `latex_beta_pdf.tex` which will then be used by LaTeX to generate an internal copy of `latex_beta_pdf.svg`.

Finally, just use the mouse to move the equation into position and alter the scaling as required to obtain the final plot saved as `beta_pdf_with_equation.svg` shown previously at the start of this document.

Summary

The programs referred to in this document are as follows.

1. **EditSVG** is a SimFIT and SimDEM program that takes in SVG or TEX files and writes out SVG and other files.
2. The SimFIT program **simplot** and the SimDEM program **simdem70** take in SimFIT metafiles and write out either SVG or EPS files.

Further, the SimFIT test files (*.TEX and *.SVG) described in this document that can be used by program **EditSVG**, and those (*.EPS) that can be used by program **editPS** are now listed.

File name	Data included
`beta_pdf_plot.metafile`	SimFIT or SimDEM metafile to create the plot without any equation
`latex_beta_pdf.tex`	LaTeX source file for the beta_pdf equation with no plot
`latex_beta_pdf.svg`	SVG file containing the formula only
`beta_pdf_plot.svg`	SVG file containing the plot only
`beta_pdf_with_equation.svg`	SVG file containing both the equation and plot
`beta_pdf_with_equation.eps`	EPS file containing both the equation and plot only
`latex_beta_pdf.eps`	EPS file containing formula only
`beta_pdf_plot.eps`	EPS file containing the plot only